IE 410 – INTRODUCTION TO ROBOTICS

Lab-8 report

Turtlebot3 and simulation

Team M410:

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- **Installing turtlebot3**

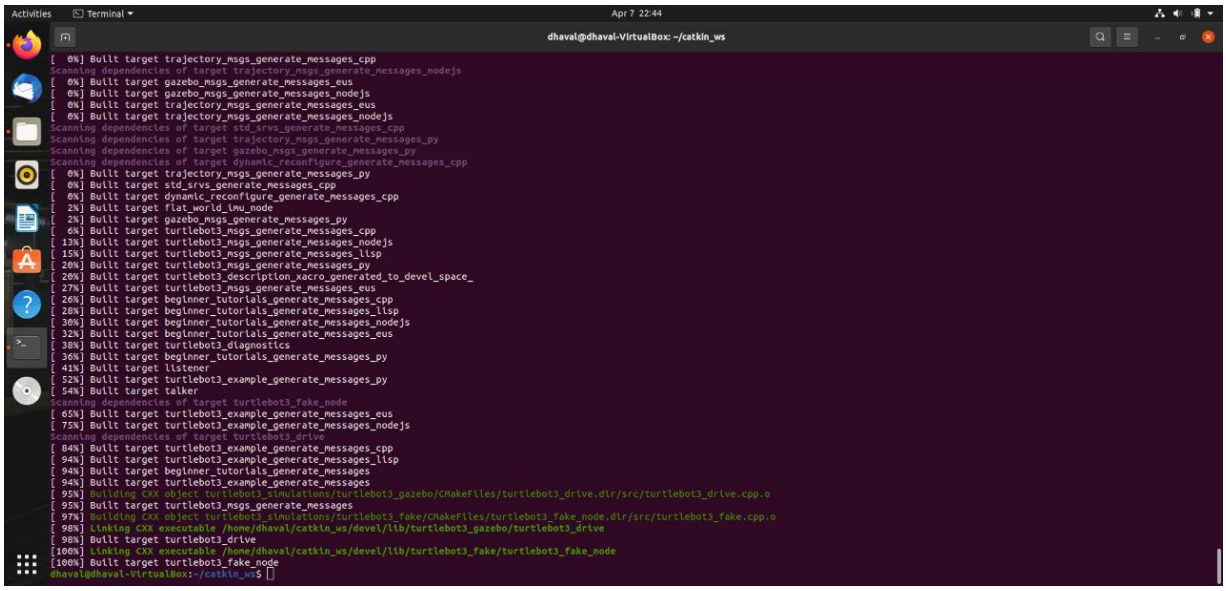
  Run following commands to install turtlebot3

```
$ cd ~/catkin_ws/src/
$ git clone https://github.com/ROBOTIS-
GIT/turtlebot3_msgs.git
$ git clone https://github.com/ROBOTIS-GIT/turtlebot3.git
$ cd ~/catkin_ws && catkin_make
```

  After, add following line in our .bashrc file export TURTLEBOT3_MODEL=burger

  Now run the following commands

```
$ source ~/.bashrc
$ cd ~/catkin_ws/src/
$ git clone https://github.com/ROBOTIS-
GIT/turtlebot3_simulations.git
$ cd ~/catkin_ws && catkin_make
```



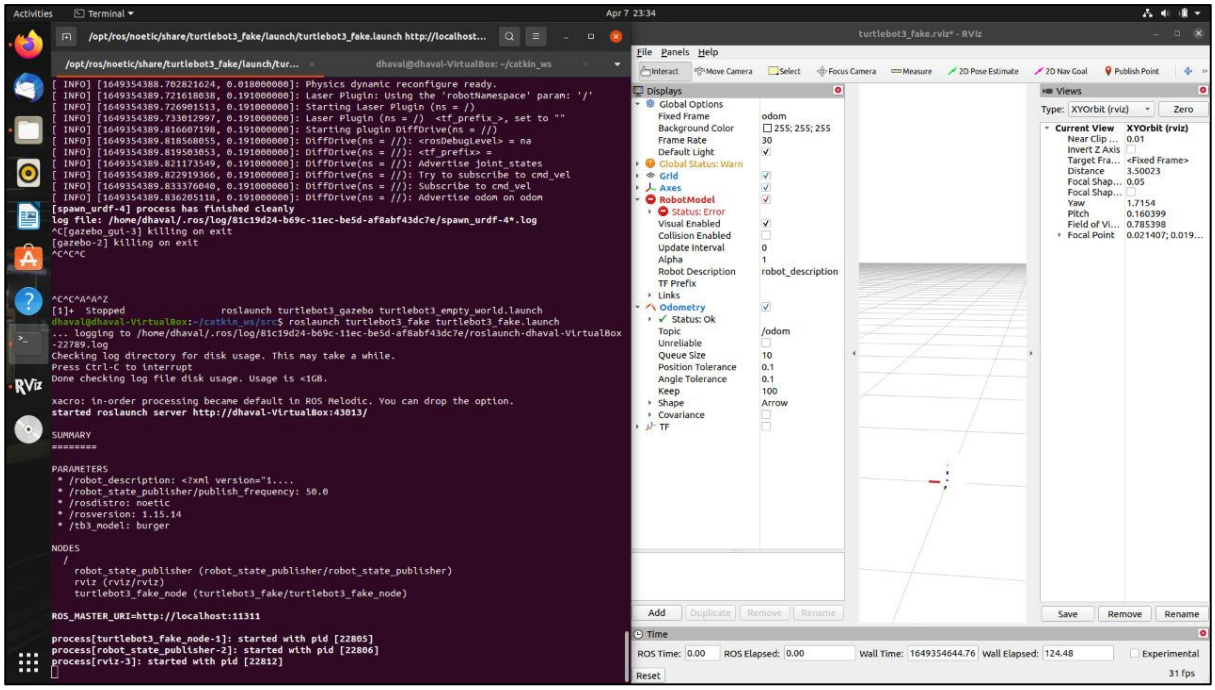
- **Simulate turtlebot3 using RViz**

Run the following command to simulate turtlebot3 using RViz.

```
$ roslaunch turtlebot3_fake turtlebot3_fake.launch
```

If you want to control turtlebot3 using your keyboard run the following command.

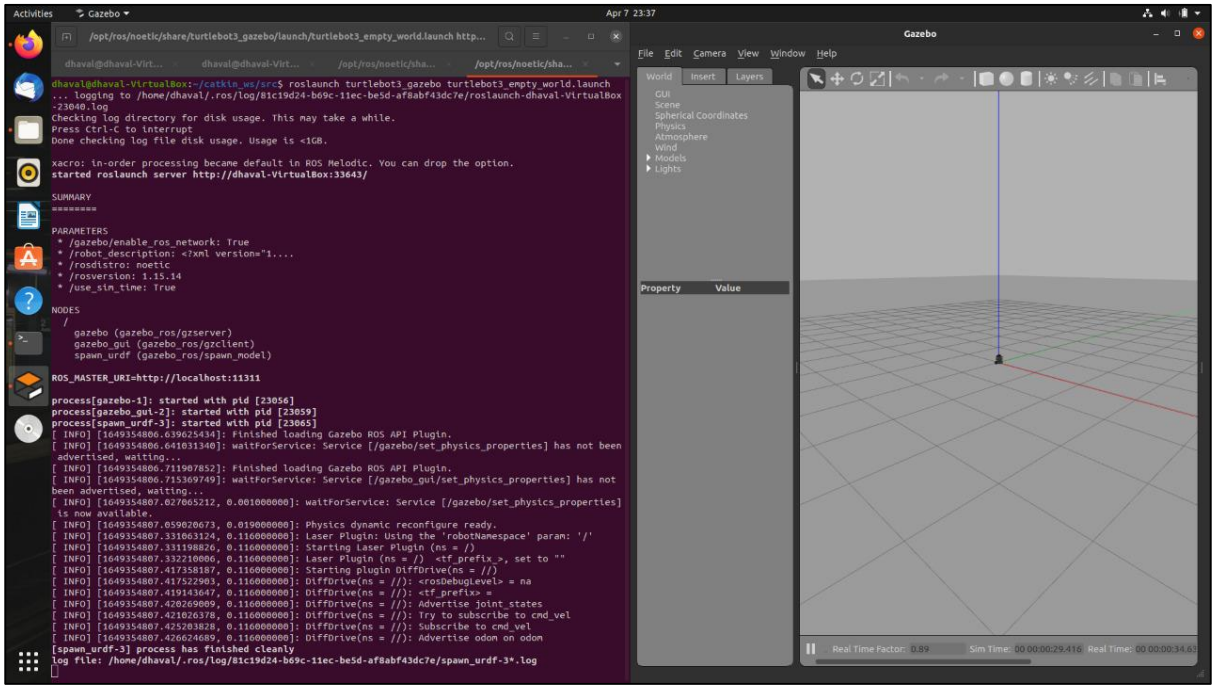
```
$ roslaunch turtlebot3_teleop turtlebot3_teleop_key.launch
```



- **Simulate turtlebot3 using Gazebo**

Run the following command to simulate turtlebot3 using Gazebo.

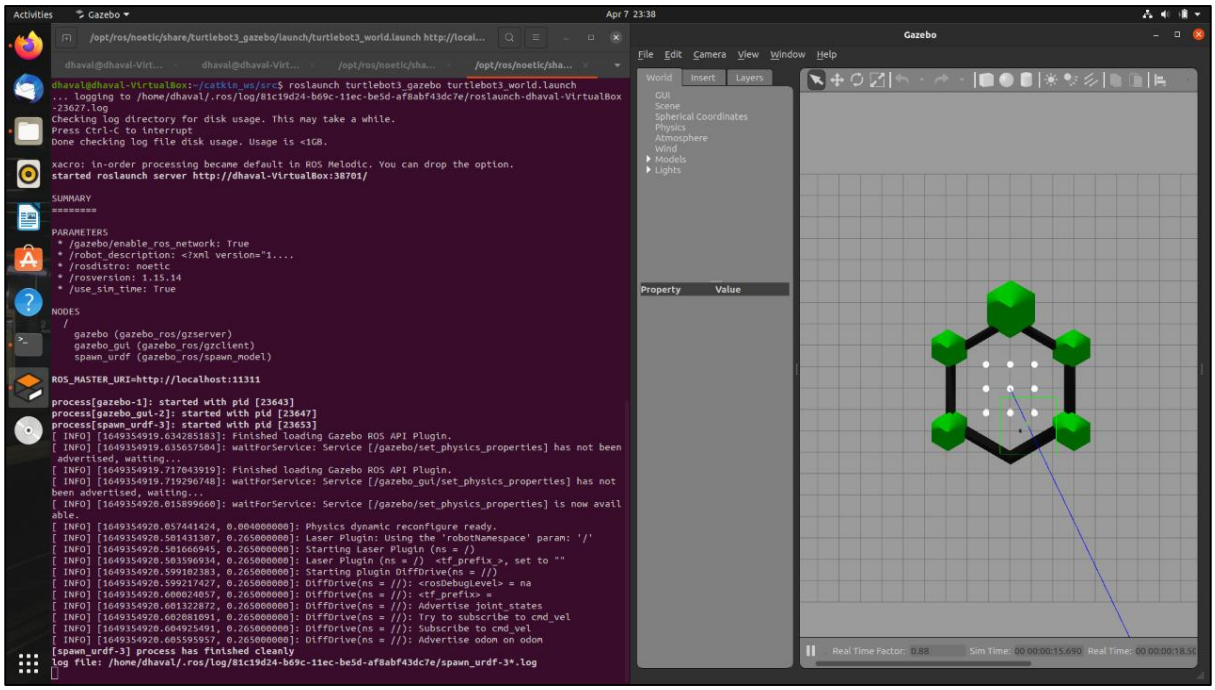
```
$ roslaunch turtlebot3_gazebo turtlebot3_empty_world.launch
```



- **Managing simulation environment of turtlebot3**

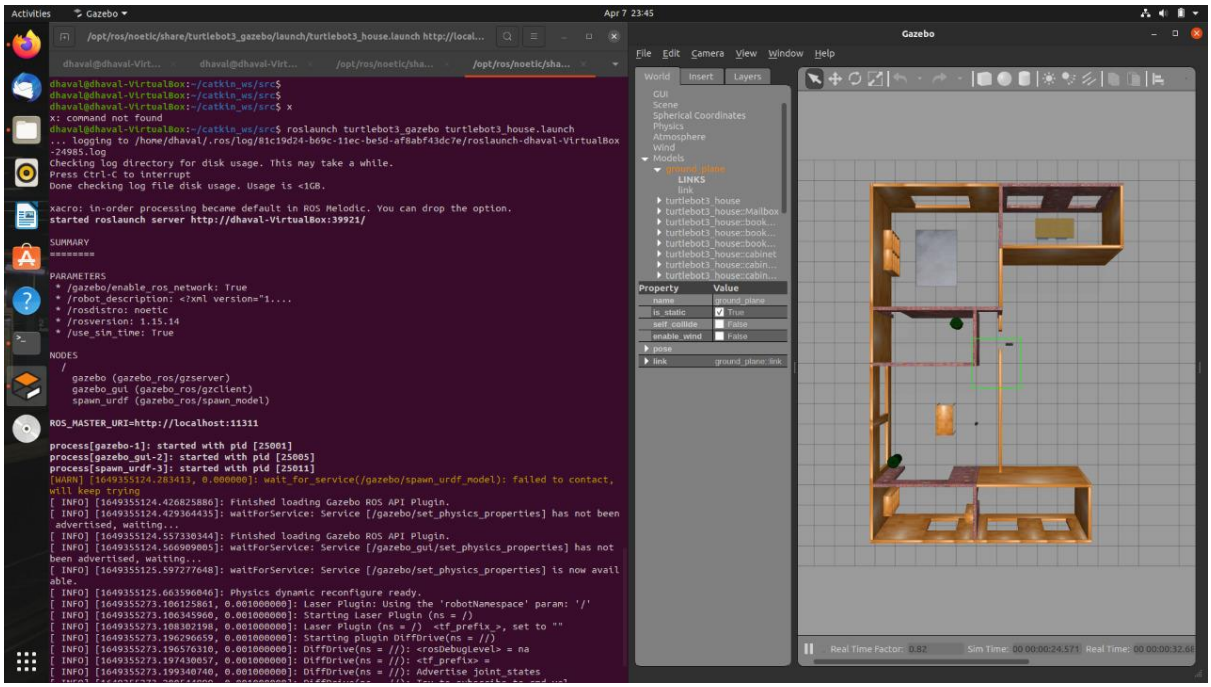
Let’s look at our turtlebot3 in a different environment. This environment is often used for testing SLAM and navigation algorithms. Simultaneous localization and mapping (SLAM) concerns the problem of a robot building or updating a map of an unknown environment while simultaneously keeping track of its location in that environment.

```
$ roslaunch turtlebot3_gazebo turtlebot3_world.launch
```



Type this command and wait a few minutes for the environment to load to stimulate turtlebot3 inside a house.

```
$ roslaunch turtlebot3_gazebo turtlebot3_house.launch
```



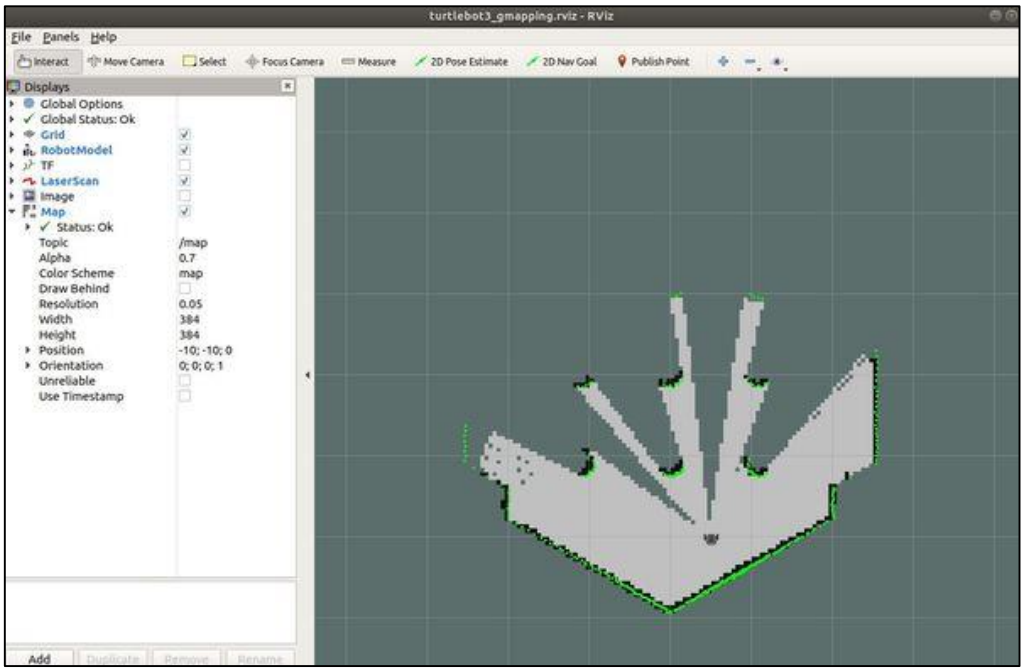
To move the turtlebot with your keyboard, use this command in another terminal tab:

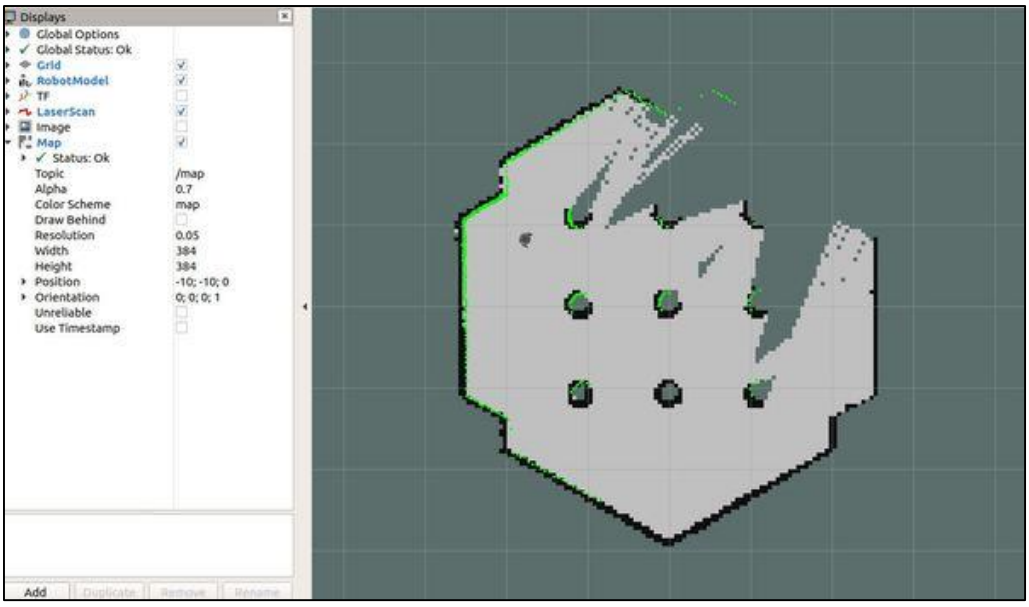
```
$ roslaunch turtlebot3_teleop turtlebot3_teleop_key.launch
```

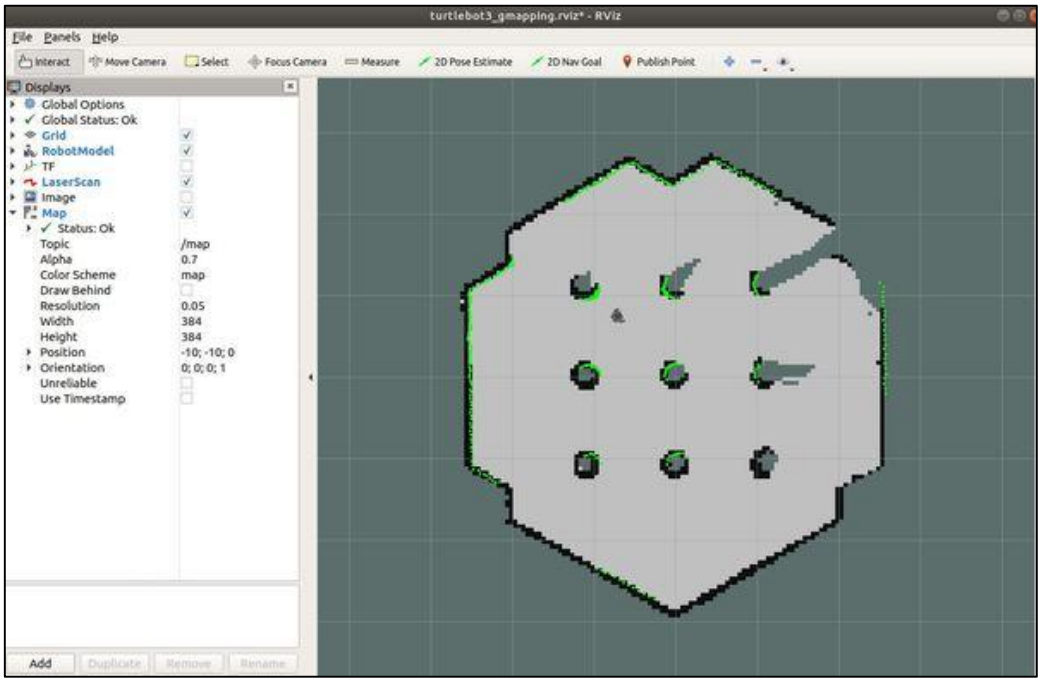
- **Simulating SLAM with TurtleBot3**

  Install the SLAM module in a new terminal window.

```
$ sudo apt install ros-melodic-slam-gmapping

$ roslaunch turtlebot3_gazebo turtlebot3_world.launch

$ roslaunch turtlebot3_slam turtlebot3_slam.launch
slam_methods:=gmapping

$ roslaunch turtlebot3_gazebo turtlebot3_simulation.launch
```






turtlebot3_gmapping.rviz* - RViz
File Panels Help
Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Global Status: Ok
Grid
RobotModel
TF
LaserScan
Image
Map
Status: Ok
Topic /map
Alpha 0.7
Color Scheme map
Draw Behind
Resolution 0.05
Width 384
Height 384
Position -10; -10; 0
Orientation 0; 0; 0; 1
Unreliable
Use Timestamp
Add
Duplicate
Remove
Rename